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Wireless Telegraphy in the Canadian Corps in France

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The author has been assisted in the preparation of this series of articles by the following ex-members of the Canadian Corps Wireless Company: Captain A. R. St. Louis and Captain W. L. Laurie of The Royal Canadian Corps of Signals, and Lieutenant F. G. Carleton of No. 13 Battalion, Canadian Corps of Signals. Much of the detailed information with regard to the early days of radio in France has been supplied by these officers, all of whom were members of the original section and detachments.

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Introduction.

Just ten years have elapsed since the last of the Canadian Signal units returned from overseas, but already our recollection of the details of those stirring times is fading into the general background of post-war days. It is well that this is so for civil-re-establishment in Canada has brought with it problems that require the entire energy and ability of her soldier-citizens. The old Wireless Company of the Canadian Corps is still taking a prominent part in this work, for ex-members of the organization are to be found in almost every part of the country occupying important positions in its commercial, academic and engineering organizations. Some members have remained in the Canadian Signal Service since their return to Canada and are assisting in the development of the systems of radio stations which the Department of National Defence are operating in the Northwest Territories, the Forestry Protective Service and more recently in the trans-Canada Air Mail work. But that is another story already covered in part in past issues of this magazine.

The present series of articles is intended to recall and chronicle the history-making achievements of those small but energetic bodies of radio enthusiasts, officially known as The Wireless Sections of The Canadian Corps Signal Companies.

The official history of the Canadian Signal Service has not yet been written but it is hoped that these short articles may recall pleasant memories to all ex-members of Corps and Divisional Wireless Sections, and yet prove interesting to other readers of the *Quarterly* whose activities lie in other branches of military service.

The information contained in these articles has been collected by the author from personal recollections, records and documents on file and from ex-members of the various sections now living in Canada. It is very probable that inaccuracies will be found, particularly in that part of the story up to July, 1918, due to the length of time which has elapsed, but the best that we can expect is to have the main details correct and to portray the inauguration and gradual development in the Radio Service of the Canadian Corps from May, 1915, to May, 1919.

Part I—Trench Warfare.

CHAPTER I.

THE BEGINNING OF WIRELESS IN THE CANADIAN CORPS.

WHILE wireless training had been a part of the work of the Telegraph Sections of The Royal Engineers before the outbreak of hostilities in 1914, little attention had been paid to it in Canada. It is true that there were in Canada prior to the War, two French Pack sets and several Marconi Pack sets under the supervision of Captain (now Major) Charles Shergold, M.C., D.C.M., then a Sergeant Major in the Royal Canadian Engineers. Major Shergold was in England when war broke out, taking a special course in Wireless Telegraphy; he volunteered

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for duty at once and went to France with the first part of the British Expeditionary Force. It was while serving with one of the R.E. Wireless Sections that he received his commission and won the Military Cross. Major Shergold later commanded the Canadian Signal Training Centre at Folkestone and took a very active part in the training work when the new centre was organized at Seaforth, near Brighton.

Only two instances are on record of the use of these sets in Canada following that momentous day, August 4, 1914. When Canada's First Contingent assembled at Valcartier, the two French Pack sets were put into service. Some training was carried out here but when the Contingent sailed the sets were turned back into Ordnance and left in Canada.

Again, in the fall of 1915 when the troops were moved from Niagara Camp to the Exhibition Grounds in Toronto, the Marconi Pack sets were set up at Niagara and Burlington, and with the assistance of the station erected at the Faculty of Applied Science, Toronto University, communication was maintained throughout the period of the march.

The next recorded use of radio by the Canadians was in France during May, June and July of 1915. Newspapers were practically unknown at the front during the early days so it is not surprising to learn that efforts were made to pick up press and propaganda being broadcast from all the large stations in both allied and enemy countries. Sappers Carter and Max of the Headquarters Section, 1st Canadian Divisional Signal Company, built a long wave receiving set from parts salvaged in the battle area, and operated a most successful Press Bureau at Divisional Headquarters. Press reports were received regularly from Poldhu, England, Eiffel Tower, France, and Nauen, Germany, and propaganda from numerous stations in Austria, Russia, Germany and America. To these men must go the credit for inaugurating the Wireless Service of the Canadian forces in France.

During 1914 and for the first ten months of 1915, all Wireless in the British forces in France was controlled and operated by the Army Wireless Companies, but in November, 1915, a start was made towards the organization of Corps Sections, when Wireless Schools were started at all Army Headquarters. Seventeen men from the 1st Canadian Division, together with six more from the newly arrived 2nd Division, reached Second Army Headquarters, Cassel, late one afternoon and were billeted in an old convent. Captain Wright and Lieutenant Broadwood of the Royal Engineers were the instructors and a very good practical course was put on. Captain Wright, who was a graduate of Toronto University, had been with the Shackleton Expedition and wore the white ribbon.

The training which the men received while at Cassel was not confined entirely to radio, and many of this original company will remember the practice station located at Oxelaere, and the three new recruits, Suzanne, Aimee and Irene, "adopted" by the section at that time.

The nucleus of the Canadian Section thus gathered at Cassel, while containing a number of senior N.C.O.s. had in addition certain ones skilled in the game of poker and other money-making pastimes. As a result, when

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Christmas rolled around, the Canadians were in a position to entertain right royally. New Year's found the celebration still in progress but rapidly becoming faint for lack of funds. At this stage Sapper Wilson, late of the 10th Battalion, essayed to provide the feast from a near-by chateau. The moat of this chateau contained a number of swans and it only required one more trip to the "bootlegging" corner barber shop to provide the necessary courage. Wilson was rescued by his comrades while swimming in the moat and just in time to save the life of the swan and the reputation of the Canadian Wireless Section.

Early in January, 1916, eighteen men were sent back to the Canadian Corps in charge of Sergeant Sharpe and the first stations were established in the corps area. Staff Sergeant Manson, the senior N.C.O., had been selected to take charge of the Corps work and he was sent back to England for his commission. The remainder of the men, including Pte. St. Louis, one of those for whose assistance in the provision of material the author of this article is indebted, remained in the Army Shops at Cassel to get experience in the manufacture and repair of equipment. It was here that the first "Grand Piano" amplifier made its appearance. This was a three valve French amplifier, so named from its size and general appearance. It was intended for use in intercepting enemy telephone and telegraph communication and will be treated in more detail in a later chapter.

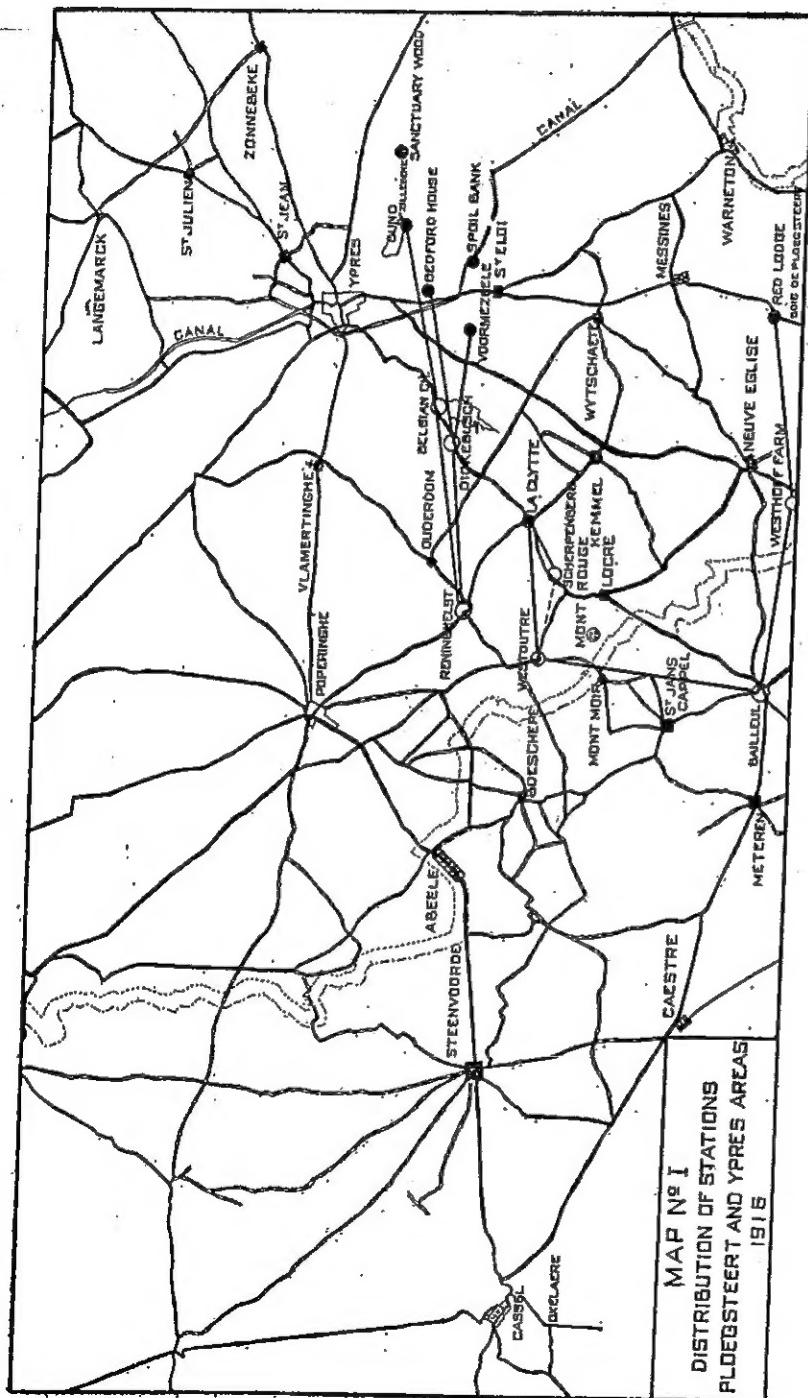
Upon the arrival of the detachment from the school, the following stations were erected in the Ploegsteert Area, as shown on the map on page 447.

- (1) A Corps Control and Reception Station at Corps Headquarters, Bailleul. This consisted of a Wilson Transmitter and Mk. III short wave receiver.
- (2) A Sterling Transmitter and Mk. II receiver at Westhoff Farm, Report Centre for the 1st Canadian Division.
- (3) A set, similar to (2) at 2nd Canadian Division Headquarters, Westoutre.
- (4) Two B.F. sets were received late in January and were placed at 3rd Brigade Headquarters, Red Lodge Hill 63, and at 4th Brigade Headquarters, La Clytte.
- (5) The Army Control set, consisting of a Marconi 1½ K.W. Lorry set, was erected at Reninghelst.

A short description of these various instruments will be found in the Appendix, and photographs of most of them have been reproduced here and there throughout the article.

During the first few months the greatest difficulty to be overcome was the supply and recharging of batteries. Only two accumulators were supplied for each station; one to be on the set and the other to be on charge. The 1st Division had their charging done by the M.T. Company at Bailleul and the 2nd Division by the Second Army at Cassel. The distances were great and transport so limited that stations were often out of commission due to a shortage of charged accumulators.

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The 1st Canadian Division Station.

There was little real work done by any of the stations during the early months. Signals were exchanged with all other stations daily and a few messages were sent concerning rations and supplies but that was all. However, this station, which was located in an Armstrong hut on the cross-roads north-east of Westhoff Farm, had one or two rather interesting experiences. One day Adams decided to raise the aerial by shooting a grenade over a particularly tall tree near the hut. The grenade landed in the top branches and Adams was forced to climb the tree to clear the trouble. While he was up the tree the Hun began dropping a few pip-squeaks in the vicinity. Adams stuck to it until one landed particularly close, whereupon he began to descend rapidly. When almost in safety a second burst, right under the tree, sent him scurrying to the top again. Parkes and St. Louis, the other members of the crew, watched the performance from the safety of a near-by dugout, and have given it as their considered opinion that Adams did at least two miles of tree-climbing that afternoon before the enemy battery turned its attention to other targets.

Shortly after this station was erected some enemy H.E. shells fell very close to the building, giving rise to the idea that the Hun was locating Headquarters by wireless. The set was moved to an open field near Neuve Eglise and operated for several hours, but fortunately the experiment was unsuccessful.

On another occasion the operators were ordered to take their rifles, bombs and a B.F. set and go in search of a spy who was supposed to be operating a radio set in the neighbourhood. This experiment was equally unsuccessful.

The 2nd Canadian Division Station.

This station had the distinction of carrying out the first real wireless work done in the Corps. In March the set was moved up to Battle Headquarters on Sherpenberg Hill and erected in General Turner's dugout. This was at the time of the re-taking of International Trench and considerable business was transacted by wireless with the 4th Brigade station during the night.

Wireless on the Ypres Front.

On March 27th, the Corps moved into the Salient and a new distribution of wireless stations was effected. At this time the wireless personnel came under the administration of the Canadian Corps Signal Company for the first time and they were accordingly attached to brigades and divisions for duty as follows:—

- (1) A Wilson Transmitter and Mk. III Receiver at Reninghelst to replace the Army Control lorry.
- (2) A B.A.R. Receiver and Sterling Transmitter at the dug-outs behind Belgian Chateau, the report centre for the 3rd Canadian Division.
- (3) A Wilson Transmitter and Mk. II Receiver at Wall Garden, Dickebusch for the 2nd Canadian Division.

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- (4) A B.F. set at the Bund, Zillebeke Lake, for the 9th Canadian Infantry Brigade.
- (5) A B.F. set at Bedford House for the 1st Canadian Infantry Brigade.
- (6) A B.F. Set at the Spoil Bank, Battalion Headquarters.
- (7) A B.F. Set at Sanctuary Wood for the sacrifice guns of the 7th Battery, C.F.A.
- (8) A B.F. set at Voormezeele for the 6th Canadian Infantry Brigade.

While the Canadians were still in the Ploegsteert Area a number of 3rd Division operators had been sent to the Second Army School for a course and these men returned to the division just as the Corps moved into the Ypres Sector. These men were sent into the line to man the 3rd Canadian Division Station.

During the first week of April, Lieutenant Manson was injured in a motorcycle accident and was evacuated to hospital, his place being taken by Lieutenant Broadbelt of the Royal Engineers.

Wireless was still such a new thing that units were unaccustomed to its possibilities and therefore very little real use was ever made of the stations. Practice messages were sent only if the operators themselves wrote them out and by far the greater part of the traffic consisted of urgent requests for rations and accumulators.

The number of stations established constituted a severe drain on the available personnel. In some cases, and especially at the Bund and Zillebeke Lake, the same men were on the stations continuously until July, 1916. The stations were operated for the first ten minutes in each hour only and consequently the men were actually not very busy. Nothing to do and all day to do it brought the usual result, but some of the "stunts" were at least a step in the right direction.

Captain, now Major Van den Berg of the P.P.C.L.I., was M.G. Officer of the 9th Brigade, and being interested in the press reports frequently visited the wireless station. On one of these visits, the ever energetic St. Louis, who was operating that station, suggested that the radio might be used to control the indirect fire of the machine guns. Two crystal sets were accordingly made up and, since the machine gunners were not expert telegraphists, a cross word puzzle code was evolved. In the evening Captain Van den Berg, with a field telephone, would climb into his O.P. in a tree on the Bund and send his directions by phone to the wireless stations, which in turn forwarded the directions to the guns by means of the special code. Since no higher authority had been consulted before beginning this test the Army Control Station must have experienced a shock when they first picked up these signals. Be that as it may, it only required a couple of days for two Staff Officers to appear on the scene and to arrest all and sundry concerned in the plot. Their explanations must have been satisfactory as all are alive and well today.

Among many of the old operators this period is often referred to as the "Press Set Era". The available material was very limited but the ingenuity was great, and many and varied were the press sets that made

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their appearance. Everything was used from magnet wire to hairpin wire, and even G.P. twin had its adherents. Later on the craze shifted to pancake coils made from wire salvaged from a research laboratory in Ypres. Every operator carried a press set in his pocket then. Two of the sets were sufficiently ingenious to warrant a detailed description.

The set constructed by Pte. Carleton at 3rd Division Report Centre had the primary wound on a frame constructed from laths and barrel heads, while the secondary was mounted on a cheese drum. For purposes of adjustment coils of fine hairpin wire wound on S.R.D. jars were connected in primary and secondary and shifted about on the table to give different degrees of coupling, and to alter the wave length. Signals received were remarkably good and the tuning was very sharp.

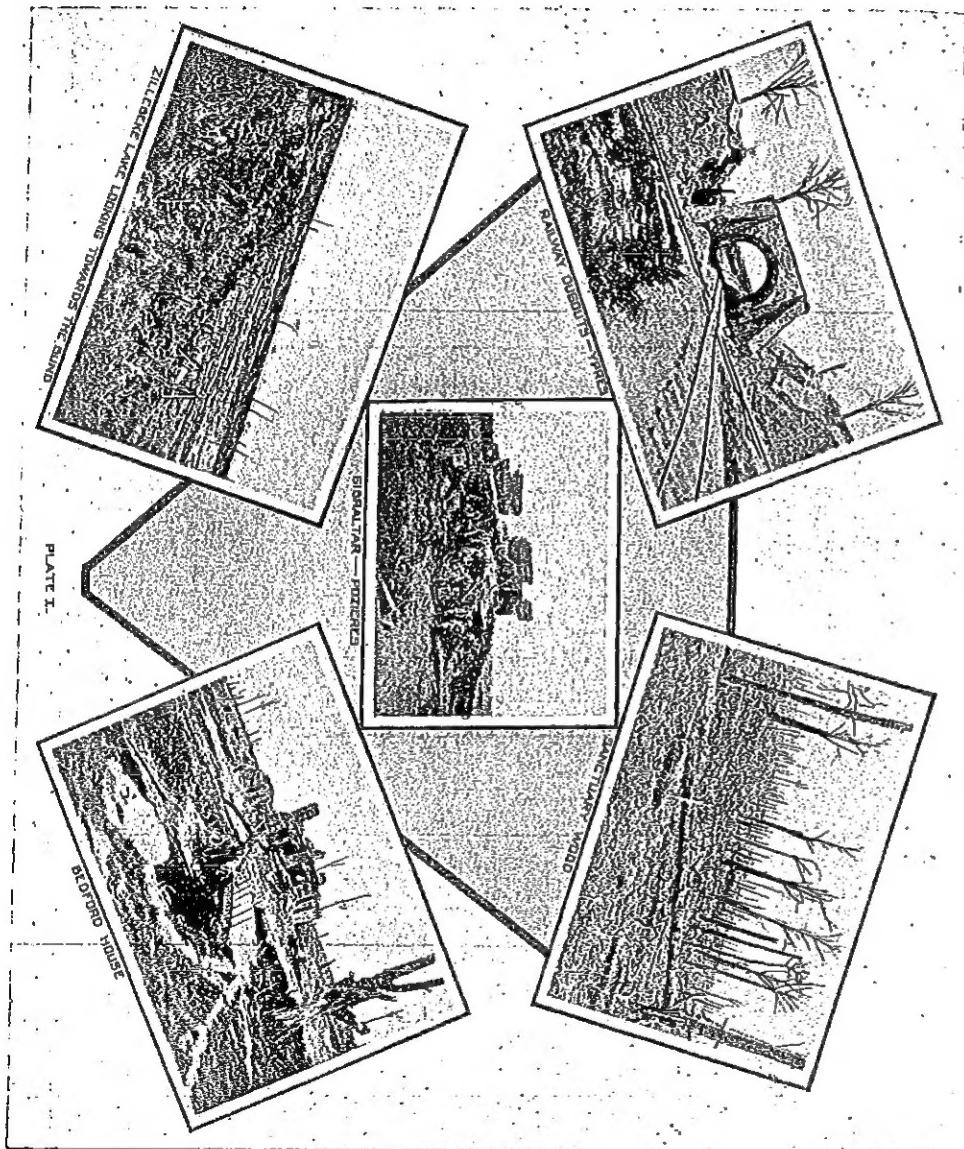
The set at Zillebeke Lake, built by Pte. Adams, was wound using G.P. twin on a rum jar case four feet long. The corners were carefully rounded off to prevent sharp kinks in the wire. The secondary consisted of two layers of hairpin wire wound on a whole cheese case. The inductance switch was constructed from parts of electric light sockets salvaged in Ypres, while the condenser consisted of two spare accumulator plates suspended over one another and adjusted by means of a string running over a small pulley. Two Perikon crystals stuck in a match box filled with wax served as a detector. But it worked.

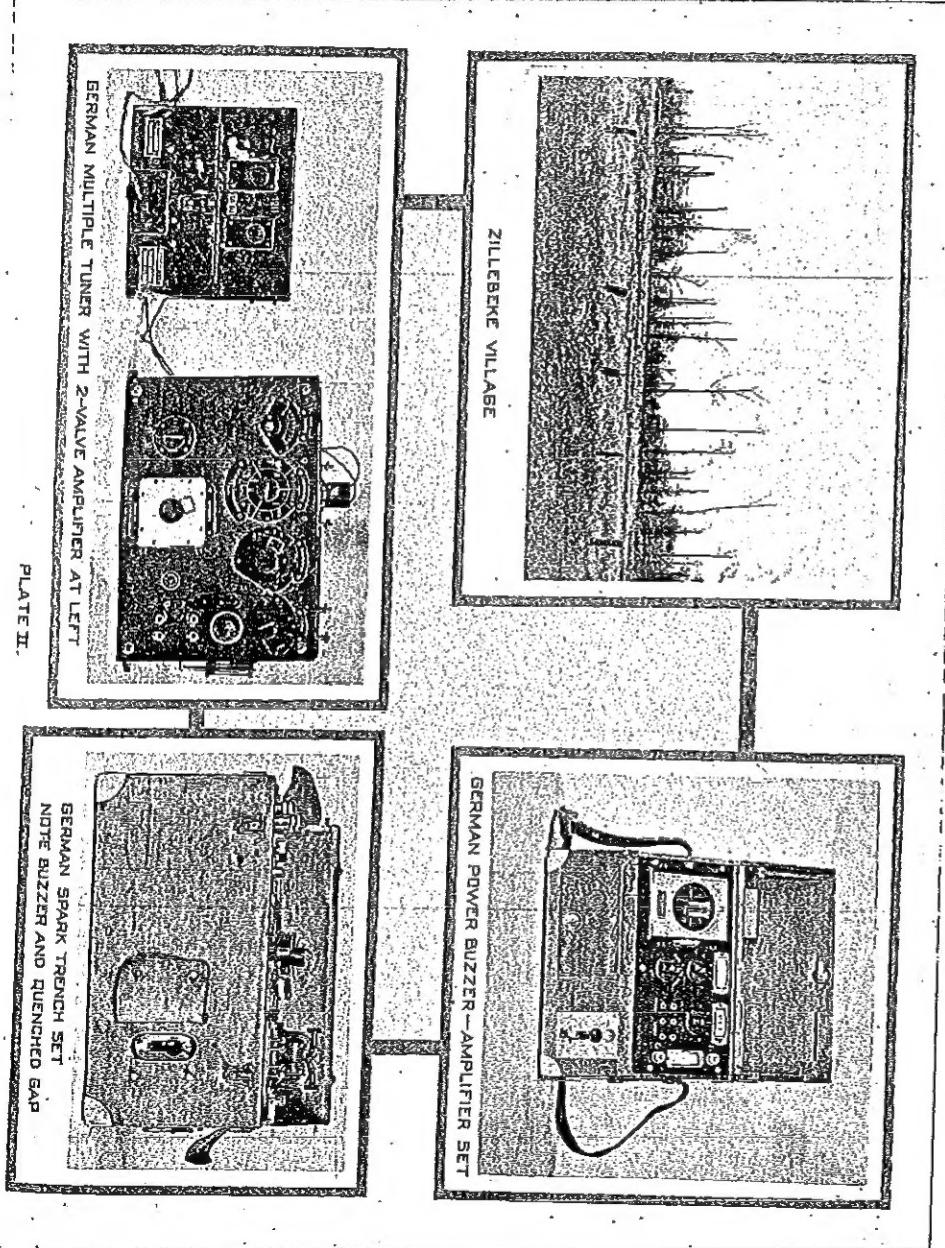
The first co-operation between wireless and artillery in the Canadian Corps occurred about the middle of May when a 9.2 Battery near 3rd Canadian Division Report Centre was connected to its O.P. by means of B.F. sets. The sets were about 6,000 yards apart and telephone lines connected the Forward Observing Officer at China Wall with the Zillebeke station, and the battery with the rear station at 3rd Division Report Centre. Four successful shoots were carried out, but the memory of the last "shoot" will long remain in the minds of the operators on the forward station. After the second shot, the F.O.O. signalled "drop 10" but, "fortunately or unfortunately" the operator in using the code made it "10 right". The mistake was discovered too late to remedy, so the relief can better be imagined than described when the F.O.O. signalled "An O.K. C.I."

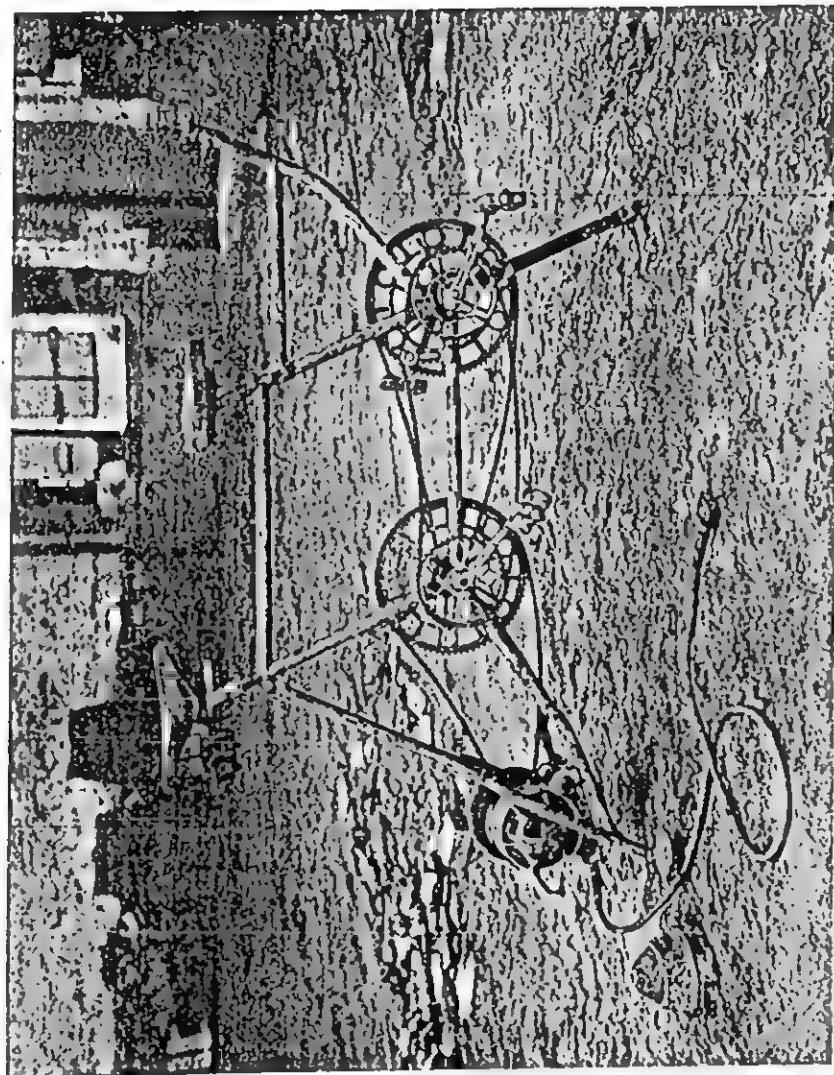
Wireless during June Fighting, 1916.

The June fighting (Battle of Mount Sorrel) constitutes an excellent demonstration of the difficulty experienced in the early days, in persuading commanders to make use of the wireless. On the second of June, although the German attack began about 7.00 a.m. and practically all telephone lines were down, no traffic reached the Bund station until 3.00 p.m. At this time a message of 250 words was handed in and cleared at once. From that time on considerable traffic to corps and division was handled. This delay in turning to wireless was perhaps not entirely due to mistrust on the part of the battalion and brigade commanders, but to a general misunderstanding of the possibilities and limitations of the wireless system.

Great things had been hoped for from the set at the sacrifice guns but

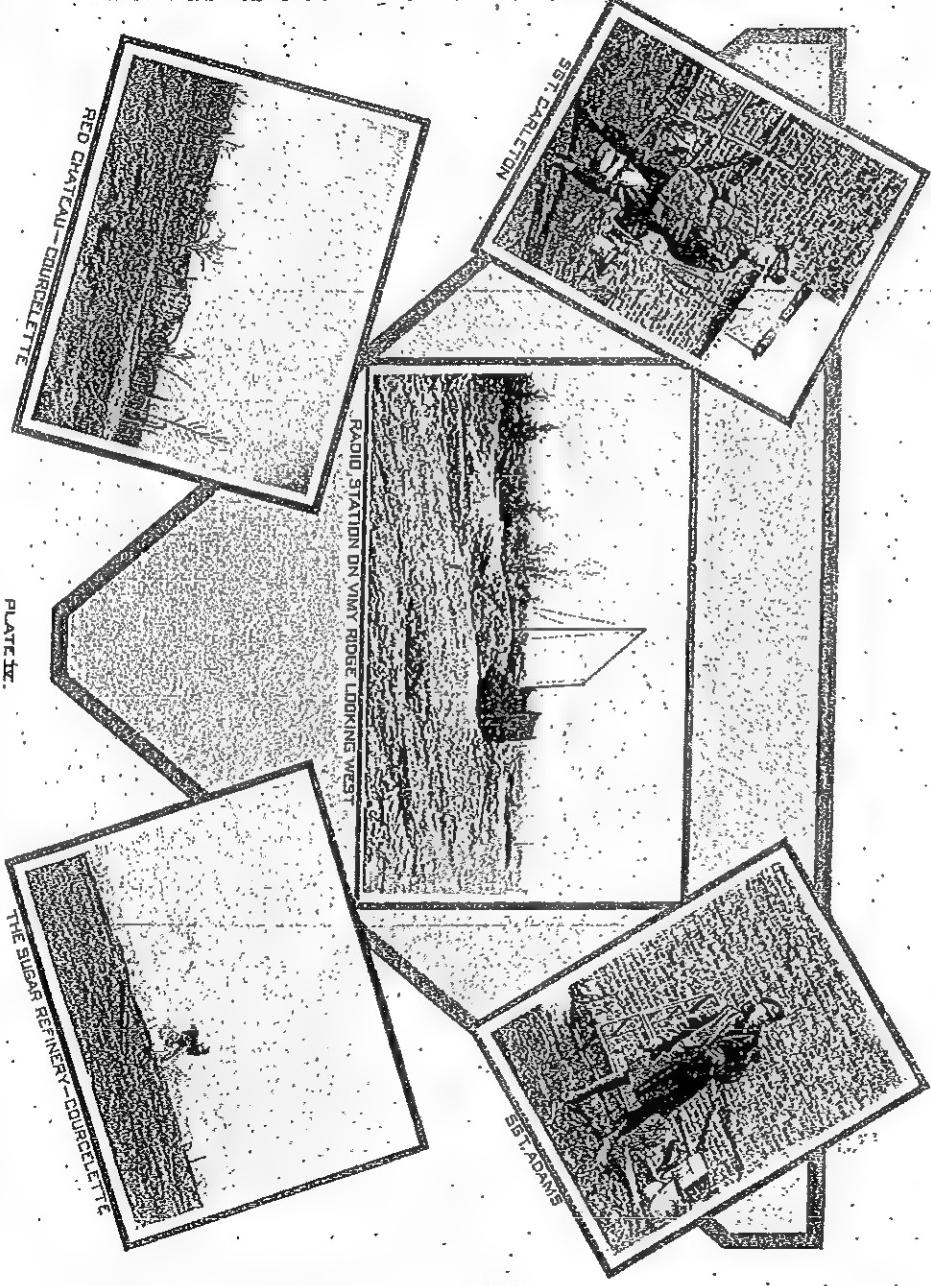






GERMAN MAN-POWER WIRELESS GENERATOR

PLATE III.



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although all stations tried to raise it nothing was ever heard. At 2.00 a.m. the following day Sapper Hood arrived at the Bund station badly wounded. He reported that the shrapnel barrage had made it impossible for them to keep up the aerials so both operators had assisted in serving the guns until the last minute. Sapper Chambers, the other operator, was killed getting out. These were the first casualties among the wireless personnel and incidentally this operation brought them their first decorations, Hood being given the D.C.M. for his gallant action.

Although enemy patrols came within 80 yards of the Bund Station it was not evacuated.

When the Canadians retook the lost ground a week or so later, a special set was erected at 1st Brigade Headquarters at Railway Dugouts as an auxiliary to the Bund station, but little use was made of the wireless at that time.

During the latter part of June the first charging set was secured by the section. A lighting plant which had been abandoned by the brigade at Transport Farm was taken over and operated in the forward area. Previous to this, all charging had been carried out by Army and by the 1st Division M.T. Company at Hoograaf. Fortunately this plant did not last very long and it was replaced by Army, about July 15th, with a new Ballet one kilowatt set. This equipment, together with the entire reserve stock of accumulators for the corps, seven all told, was placed at Reninghelst.

It was here that McClellan proved to the amazement of a certain R.E. Officer, that the charging of accumulators was a truly reversible reaction. If gasoline supplied to an engine would charge batteries, why wouldn't batteries attached to the same engine produce gasoline! While working under instructions, vainly trying to charge a 40 volt bank from a 30 volt generator, McClellan discovered that the generator would run backwards as a motor. This of course turned the engine over in a way no engine was ever intended to be operated with the result that a beautiful stream of gasoline squirted from the carburetor, to the entire stupefaction of the aforementioned officer.

It was during this period in the Ypres Salient that the first experiments with Power Buzzers were made, but this subject will be treated in detail in a later chapter.

Three new pieces of apparatus appeared about this time. The first was a form of valve detector for the Mk. III Tuner. It utilized a French valve and was coupled to the receiver by means of two small pancake coils. It was tried out at the corps station and found to be very sensitive. The second was the short-circuiting device for the crystal detector of the B.F. set, and the third a two-valve French amplifier.

CHAPTER 2.

WIRELESS ON THE SOMME AND AT VIMY RIDGE IN 1916.

In August, 1916, the Canadians moved from the Salient to the Somme, being relieved by the II Anzac Corps. In order to insure that the radio

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stations would be in position and ready for operation by the time the infantry and artillery arrived, the Canadian W/T Section of twenty-three men, with all their equipment, was sent off in two 3-ton lorries for Albert. Another reason for the early establishment of the Canadian Wireless stations in the Somme Area was to prevent the Germans from discovering the exact date of the front line relief. It was about this time that the Higher Command began to realize that the radio stations constituted an excellent indication of the movements of units and corps. The change in calls, methods of operation, and even the style of the individual operators served to inform the enemy that a change was taking place in the area opposite him.

The trip down will long be remembered by those included in the party. Just before leaving Reninghelst, a detachment of men returned to the corps from the school at Cassel. Among these were Laurie, Skinner, Smedley and Patmore. As the journey was livened by songs from such well known Caruso's as St. Louis, Glen Parks and Art Adams it is small wonder that after the noon-day stop at Merville, it required several hours, and as many M.P.'s, to round up the radio gang. Late that evening they arrived at the new Corps Headquarters at Contay, and most of the men spent the remainder of the night rolled up together under the lorries, as this was the warmest and driest spot to be found. It was a real introduction to the world-famous Somme mud.

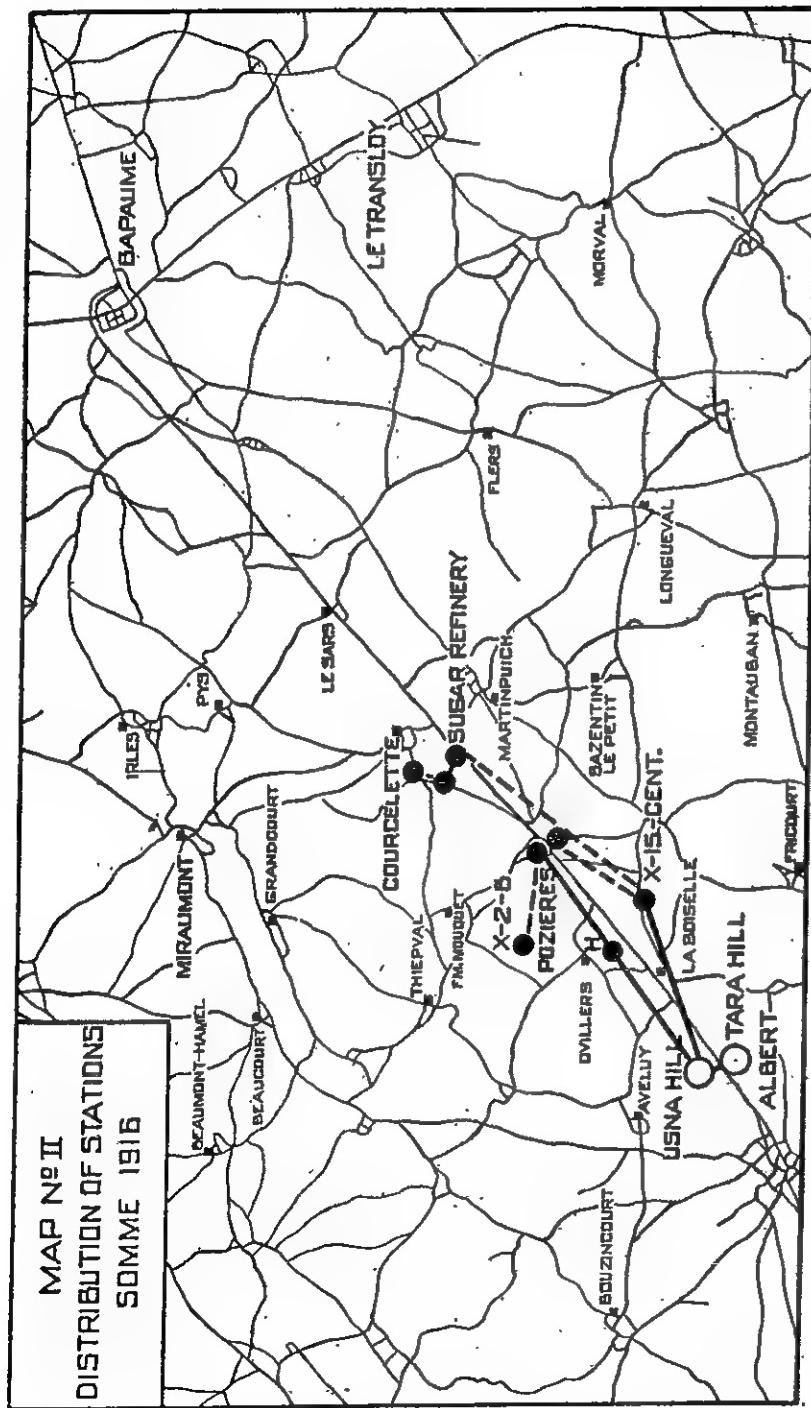
On August the 3rd, the Canadian Corps station relieved the Pack Set of the Reserve Army at Tara Hill and took over the control work. It was considered advisable at this time to drop the divisional working and to place the sets at certain strategical points, and where line communication was difficult to maintain. This move was not entirely successful. Experience here and during subsequent operations proved that the radio stations were much more useful when definitely attached to units. Not only were the personnel supervised and their needs attended to, but the stations were then definitely considered as a part of the system of communication operated by that unit.

On August 6th, the entire section moved from Albert to the Divisional Headquarters at Tara Hill just south of the Bapaume Road, and the following stations were established in the area:

- (1) Control Set at Tara Hill.
- (2) B.F. set at Gibraltar, the old German concrete dugout in Pozieres.
- (3) B.F. set in dugouts across the main Albert-Bapaume Road from Gibraltar. This set was later moved to X-15 Central, the Brigade Headquarters, and again to the Sugar Refinery for the taking of Courcelette.
- (4) B.F. set at H test point, on the buried cable, near Ovillers.

Very little use was made of any of these stations at first, although overland lines were extremely difficult to keep up and the buried cable was far from being perfect. The station at H test point was never even put into operation.

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Again the arrangements for charging batteries were unsatisfactory. The charging for all stations was carried out by the Corps Headquarters lighting lorry at Contay, behind Albert, the charged accumulators being delivered by ration lorry to the control station at Tara Hill. From here they were taken up in any way that the personnel themselves could arrange; sometimes by car or ration wagon but more often than not they were carried up by hand by the operators.

On August 10th, a 70 foot tubular steel mast was received from Army and erected at Usna Hill, just north of the Bapaume Road. The Directing Station was moved over to this location about this time, where it was used almost entirely as a press station. All English, French and German press was copied and interpreters were attached to translate the foreign despatches.

For the attack on Mouquet Farm, the Gibraltar set was moved to Battalion Headquarters in X-2-b, near some 18 pounder field guns. The location was chosen "not wisely but too well" and when the barrage opened, the first shots carried one of the masts about 50 yards down the field. It was rescued and repaired later on in the day, and the station was fortunate in being able to handle several S.O.S. calls during the attack. It was in this same fighting that the first use was made of Power Buzzers on the Somme but this will be covered in more detail in Chapter 4.

On September 15th, when the Canadians captured the Sugar Refinery, the second, Pozieres set was moved to the Battalion Headquarters just to the left of the Refinery. This proved to be a very useful station and about a dozen important messages were transmitted for the battalion to their brigade and division. In the afternoon of the same day, the attack was continued against Courcelette, and the station was moved forward with the battalion. Again the location proved fortunate, and between the fifteenth and twenty-third of September considerable traffic was handled.

During this period a very interesting and ingenious experiment was attempted. It was physically impossible to maintain lines from this Battalion Headquarters to the front line and an attempt was made to cover the gap by wireless. A narrow trench, 30 yards long and tapering from ten feet deep at one end to five feet at the other, was dug 200 yards behind the front line, and a B.F. set erected there. Short masts were placed in the trench, which was also used to enable the aerials to be repaired without exposing the men. Unfortunately the masts were allowed to project too far above ground and the station, being therefore conspicuous, was shelled almost continuously by the enemy guns. It might have worked if the antenna had been kept within a few feet of the ground.

All the blame for lack of complete success by the W/T Section cannot be laid at the door of misunderstanding of our usefulness and importance. On the night of the Courcelette attack, the officer in charge of the section rushed into the Gibraltar station in Pozieres, armed three of the operators with a B.F. set and sent them off with the following instructions: "Go straight up the road (Bapaume Road) as far as possible, then erect the station and tell all the units in the vicinity that you are open for business."

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It is a credit to the Canadian Tommy that they got as far as the old tank "Creme de Menthe" near the Sugar Refinery, where they waited for hours for the barrage to lift. Although they wandered about all night they could not find any unit willing to take them in and allow them to erect the station. The simple explanation was that no previous arrangements had been made for the accommodation of the station.

In all fairness it should also be stated that the necessity for coding and decoding every message handled over the radio, was a detriment to its more extensive use. This defect has not even yet been entirely removed, although automatic machines for performing this work are rapidly nearing perfection. In 1916 the cipher work was all carried out by the operators and, with the limited staff available, the elapsed time between the handing in and the delivery of a message was quite long.

During the sojourn of the Wireless Section on the Somme the real hero of the radio was E. R. McLellan, afterwards killed in action in Cite St. Pierre. He was tireless; on the go all the time, with batteries, valves, spare parts and even rations. He visited the stations day and night correcting troubles. He knew no fear, and a straight line was the only route he would ever consider when travelling from point to point; and when it came time for the Canadians on the forward stations to be relieved, McLellan took the new men up and brought our own boys out. His example went far to create that *esprit de corps* that played such an important part in the work of the Radio Section in the days to come.

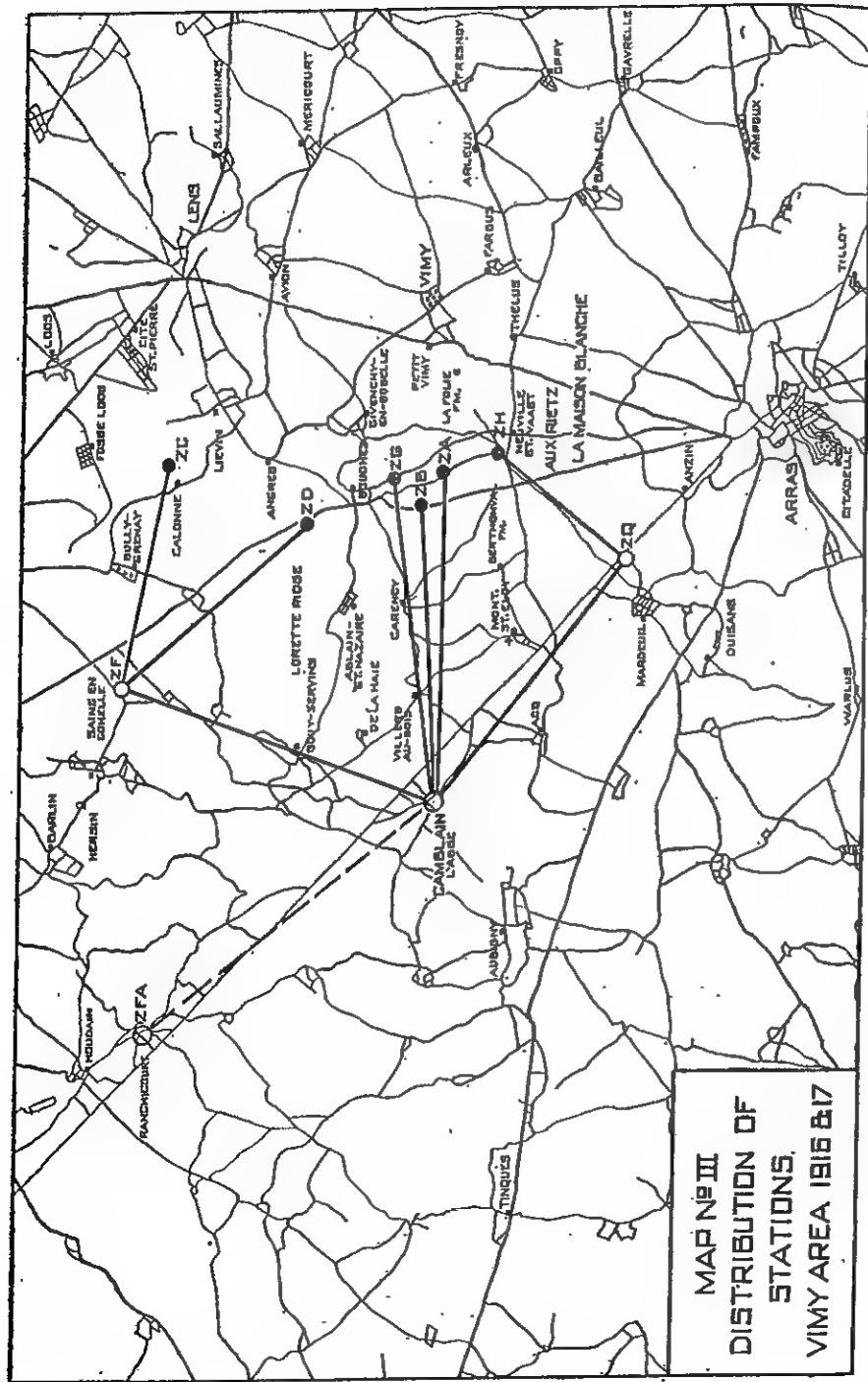
It is interesting to note that a workable system of communication by wireless was gradually being built up and, while the amount of traffic handled was disappointingly small, good pioneer work was done in educating units as to the possibilities and limitations of the radio stations. During this time the only outstanding development was along the line of transportation. Just before leaving the Somme the Corps Signal Company received a Napier Box Car for the use of the Wireless Section. This was perhaps one of the most useful additions ever made to our equipment.

On September 23rd the Canadian Corps was relieved by the IV Corps, and prepared to move north to take over the Vimy Ridge Sector. The new headquarters was to be located at Ranchicourt and the next day the Wireless Section, complete with box car, left for their new home.

Upon taking over the Vimy front, a much more elaborate system of stations was laid out, but still the divisional organization was not adopted. The following stations were established.

- (1) Directing station erected over the blacksmith shop, Ranchicourt. The call was ZFA and the equipment consisted of a Wilson transmitter and Mk. III tuner.
- (2) B.F. set at Advanced Brigade Headquarters, Cabaret Rouge. The call was ZB.
- (3) B.F. set at Right Battalion Headquarters on Vimy Ridge about 50 yards north of Tottenham Court Road. This was station ZA.

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- (4) B.F. trench set at Left Battalion Headquarters just north of 130th Alley and on the Ridge. This station was known as ZG, and only stayed out for about four weeks.

Two weeks later three additional sets were erected:

- (5) B.F. set in Headquarters Trench in front of Lorette Ridge, Call ZD.
(6) B.F. set in Calonne, with call ZC.
(7) B.F. set at 2nd Division Headquarters in Sains-en-Gohelle and called ZF.

About the middle of November two more radio stations were established for the 3rd Division.

- (8) Battalion Headquarters at Neuville St. Vaast, call ZH.
(9) 3rd Division Report Centre on the Mont St. Eloy-Arras Road.
This was station ZQ.

Again it is necessary to record that even after all this elaborate preparation, very little real message work was turned over to the stations to handle. The chief difficulty was the lack of divisional and brigade organization and this drawback was not removed until about the middle of 1917, after the Vimy operation was over.

Lieutenant Manson returned to the corps about the first of November and relieved Lieutenant Broadbelt, who had been in charge since the motorcycle accident in April, 1916. His first action was to move the Directing Station from Ranchicourt to Camblain l'Abbe where it was closer to the front and had a much better opportunity to function.

All members of the Canadian Corps who spent any time on the Vimy front during the early days of 1917 will remember the "flying pigs" that arrived with great regularity from the German lines almost every day. It is certain that Sappers Laurie and Drane, who manned station ZB, will not soon forget this phase of the Vimy operations. Sapper Laurie, now Captain Laurie and one who has assisted in the preparation of this story, had gone up with Drane to take over the station on New Year's Day. Originally this set was located at Cabaret Rouge but, in an endeavour to make it more effective, had been moved to a shallow tin covered dugout on the northern end of the Ridge, about one hundred yards behind the front line trenches. At noon on the 12th Drane proceeded on leave, leaving Laurie alone on the station. At 10 p.m. the usual bombardment began and within a few minutes the station was demolished by a direct hit from a large mortar, burying Laurie and the set in the ruins. He was not seriously injured but was held down by the remains of the roof of the dugout and unable to move hand or foot. Several hours later during a lull in the "strafing", he was able to attract the attention of some men in a near-by shelter, and with picks and shovels they started to dig him out. They were driven off several times by the heavy shelling and not until 6 a.m. were they able to get back to work in earnest. Laurie was recovered from the wreckage about 8 a.m. fortunately little the worse for his adventure.

Wireless During the Vimy Show.

A special effort was made to make the wireless of some real value during the Vimy fighting on April 9th and to this end the following disposition of stations was made:—

- (1) Corps Directing Station and Advanced Supply Depot was established at Auritz Corner at the Advanced Headquarters of the 2nd Canadian Division on the night of April 8th.
- (2) B.F. set erected at Maison Blanche for the Advanced Headquarters of the 1st Canadian Division. B.F. set at Ben Tata Tunnel for the 3rd Brigade. B.F. set at Labyrinth Caves for the 2nd Brigade.
- (3) The 2nd Division front was covered by two B.F. sets working back to the Corps Station at Auritz Cave. One B.F. set at Machine Gun Fort. One B.F. set at Zivy Cave.
- (4) An attempt was made to establish a control station for the 3rd Canadian Division at Fort George but without success. Two sets were used on this front. One B.F. set at Brigade Headquarters in Territorial Trench just east of the Arras-Souchez Road. This set had previously been located at the Report Centre near Mont St. Eloy. One B.F. set at Machine Gun Fort.
- (5) Two sets only were erected on the 4th Canadian Division Front: One B.F. set near Souchez on the left front. One B.F. set at Tottenham Tunnel. This had previously been Right Battalion Headquarters station.

During the first few days following the attack, all stations moved several times following up Brigade and Divisional Headquarters but very little work was done, except by the 2nd Division Stations. About two weeks after the original attack, one of the advanced stations, located at a Battalion Headquarters at the Beehive, handled an S.O.S. call in clear asking for artillery support against a German counter-attack. Assistance was secured by the infantry six minutes after the message had been sent. From that time on, a small amount of traffic was given to that station.

After the first attack, lateral communication between divisions became extremely difficult and the sets located at Divisional Headquarters handled some inter-divisional traffic.

However, it must be stated, even at the expense of further repetition, that the system as a whole was of very little real use.

This was due entirely to the lack of proper organization throughout the divisions. As a result of this the units knew very little about the possibilities of wireless and therefore few attempts were ever made to use it. The situation was very well expressed by one of the operators in a semi-official report made after the battle was over:—

"We sure didn't do much telegraphing, but it was not because we were not in a position to. Our stations were well placed, always in communication with each other but we simply weren't used, because no one knew who or what we were."

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And what was true of his station was equally true of all the others.

The Vimy attack gave the Corps its first opportunity to collect German wireless and Signal apparatus, and many and varied were the souvenirs of this type that came in. One of the most interesting was the foot-operated high frequency generator mounted on a dismantled bicycle frame. Then we knew why the note of the German stations varied so much during the sending of a message. The German combined Power-Buzzer Amplifier was a beautiful piece of equipment and very efficient. The power buzzer was constructed on the principle of the British D. III telephone buzzer but much more powerful. Shortly after this our own combined instrument came out. Several of the boys secured silver quenched gaps of the Telefunken type, and Captain Laurie operated one of them from a captured German generator in his amateur station in Agincourt after the war. Perhaps the most useful prize was a multiple tuner on the Marconi principle. This set was used at the Corps Interception station for nearly two years and proved to be both sensitive and very selective.

Photographs of most of this apparatus have been reproduced for this article.

The craze for souvenirs was not confined to any one unit by any means, and an amusing story is told about one Gregson of the Wireless Section. Late in the afternoon of April 9th, Gregson was burrowing around in old German dugouts looking for radio equipment. Turning a corner he came upon a set in perfect condition and without more ado made a dive for it. At the same time someone else, evidently interested in the same set, attempted to secure it. Gregson, being tall and well built, was determined he would not lose his prize without a struggle, and the two of them went to it in the semi-darkness. After a short but strenuous tussle Gregson had his man pinned to the floor when, to his amazement, he discovered it was the poor German radio operator who had been trying to make a get-away with his equipment.

The first continuous wave wireless sets were introduced into the Corps about April 1st, but were used exclusively for artillery communications. The story of this phase of the development will be found in Chapter 5.

CHAPTER 3.

THE FIRST DIVISIONAL ORGANIZATION.

The old adage "Better late than never" is just as true today as it was when first coined, and the long delayed organization of the Corps Wireless Section into Corps and Divisional Detachments was no exception to the rule. After the double lesson of the Somme and Vimy steps were taken early in July, 1917, to establish Divisional W/T sub-sections, and from this date on real progress was made in Wireless in the Corps.

Lieutenant F. H. M. Jones was Corps W/T Officer during this phase of the development, having taken over the section on May 15th when Lieutenant Manson went to England to undertake some special work in radio in the Navy. About this time the section suffered its first officer casualty,

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Lieutenant Skinner, W/T Officer for the 3rd and 4th Divisions, being wounded. Lieutenant Skinner had been granted his commission from the ranks shortly after the return of the Corps from the Somme front.

The first organization was considerably handicapped due to shortage of both personnel and equipment, but nevertheless excellent results were obtained. Each division received a detachment of one N.C.O. and nine operators, and for equipment two B.F. sets, three power buzzers and two amplifiers, with accumulators at the rate of two per station and power buzzer-amplifier set. There was only one Wilson set in the Corps and it was established as a Corps Directing station on Hill 131 just West of the Arras-Souchez Road. The system of communication was to have all B.F. sets up with the brigades, and all traffic was handled through the Directing station, which was in telegraphic and telephonic communication with the Corps Signal office. Arrangements for accumulator charging were still unsatisfactory. All charging was done at Corps, and batteries were collected and returned to divisions at regular intervals. The box car at Corps handled the deliveries between Corps and divisions, but the transportation to the forward stations was still very uncertain.

With the establishment of the Divisional Detachments, Divisional Signal Companies began to take an active interest in Wireless and Power Buzzer work. The equipment was sent out to the brigades, and the men detailed to operate the sets were attached to the brigade sections for administration and duty, and of course travelled with the brigade when it moved in or out of the line. This gave the brigade as a whole an active interest in the work and made it possible for them to definitely incorporate the radio as part of their emergency communication system.

At this time the writer was Signal Officer with the 12th Canadian Infantry Brigade and the use of the wireless in that brigade is quoted here merely as an example of what was happening in most of the brigades in the corps. The wireless operators were enrolled as members of the section and accommodation, rations and clothing provided for them whenever the brigade moved. When in the line a suitable dugout was always secured for the radio set and a special fullerphone or telephone line provided between the dugout and the signal office. Whenever the radio station was too far away for an orderly to easily handle the messages, the Fullerphone line was used. A number of docket and signal service messages were sent by wireless every day, and steps were taken to interest the staff in the work and in the use of the special field cipher code. At this time all wireless messages were sent in code in order to give the operators practice in coding and decoding, and in handling code over the radio.

While out of the line during rest periods, the wireless operators were used as instructors on power buzzer-amplifier courses run for the Battalion Signal Sections. By arrangement with the Battalion Signal Officers concerned, signallers who did particularly well on these courses were given a chance to get some practical experience on the wireless set when the brigade went into the line again. This proved to be a very wise move. Not only

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did the brigade benefit, but some excellent W/T operators were secured for the Divisional Sections in this way.

The 3rd Division were the first to attempt to handle their traffic direct from the brigade in the line to Divisional Headquarters, and so completed their divisional organization. Since only two B.F. sets were available only one of the brigades in the line could be equipped, but the experiment was highly successful and pointed the way to the complete system which came some months later. This division was the first to appoint a Divisional Wireless Officer.

(To be continued)

ALBERTA MILITARY INSTITUTE

The receipt of a copy of the ninth annual issue of the Journal of the Alberta Military Institute may justify a brief notice of one of the most progressive institutions of its kind in Canada. Nine or ten of the addresses delivered at Calgary during 1928 are published; they cover a wide variety of subjects, not necessarily military; all are of interest and some are quite outstanding. The inclusion of these addresses converts the publication into a very interesting Service Journal.

The Alberta Military Institute has not attempted to establish a building of its own, with the inevitable heavy overhead expenses and the possibility of an onerous debt hampering its activities. Meetings at Calgary are usually held in the rooms of the Garrison Officers' Mess, to which the Institute pays a blanket subscription. In its short ten years of life the Institute has accumulated a surplus of over \$4000. It has organized and helps to maintain a Cadet Corps known as the Alberta Military Institute Cadet Corps and an exacting standard is adhered to in regard to the quality and character of recruits. A very active branch of the Institute is maintained at Red Deer, where 19 lectures were delivered during the past year; another branch exists at Lethbridge. The Headquarters Institute has the very respectable number of 336 resident members and 147 non-resident; Red Deer has 30 members and Lethbridge 23. Edmonton, apparently, has not established a branch.

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to radio through casualties, sickness and transfer to other units. This was most unfortunate and crippled our efforts at a later date when operators were at a high premium.

The Stanley set was first introduced at this course but the first model was not a success and was condemned by the inventor, Captain Stanley, who was one of the instructors at the school. The set was sent to G.H.Q. for further experimental work.

A second course was started at Chocques shortly after the termination of the first one, and twenty Canadian operators attended. The N.C.O. instructors for this school were supplied from the First Army and G.H.Q. Wireless Sections. The successful candidates were not in this case allowed to go back to their units, but were sent to the Canadian Corps to man the first C.W. sets ever used in the forward area.

The First Practical Experiments.

The great question was would these delicate sets stand up and prove useful under active service conditions? The operators themselves were full of confidence but it is doubtful if anyone else, from G.H.Q. forward, shared their optimism. It might be well to point out for the information of our less technical readers, the outstanding advantages of this system of communication over the old spark sets. The instruments were lighter and more portable, worked from much lower aerials and gave a greater range for much less expenditure of power. In addition, the tuning was so sharp that four times as many sets could be operated in a given area without producing any interference with one another. The importance of this latter fact cannot be over emphasized.

The first four stations were sent out about April 1st with the intention of trying them out in the attack on Vimy Ridge. In conformity with the policy already laid down, these sets all went to Artillery units. The 13th H.A.G. and the 64th H.A.G. each received two sets. For the 13th H.A.G., the rear station, in charge of Sapper Heaps, was erected at Maroeuil and the forward set at an Observation Post, or O.P., just in front and a little North of Neuville St. Vaast. This O.P. was known as LH21. The rear station for the 64th H.A.G. was at Loue and was in charge of Sapper Beisel while Sapper Davidson had charge of the forward set which was placed at Zivy Cave. Captain Bolitho, of the First Army Wireless Company, was acting as C.W. officer for this attempt, as there was no organized C.W. section in the Canadian Corps at the time. These were the first C.W. sets ever operated on the British front in France.

As was to be expected, there was a certain amount of trouble at the start, due mainly to poor high and low tension batteries, but within two days all four stations were in good communication on a wavelength of 1,000 metres. The distances, front to rear, were about 8,000 yards in each case, but good R9 signals were obtainable at all times without using amplifiers. The aerials were about thirty feet high at the rear stations but only five feet high for the forward sets. In fact the aerials were so low that no jamming

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was experienced even from aeroplanes operating their radio sets right overhead. This was a great advantage.

On April 9th a good volume of traffic was handled over these stations from the Forward Observing Officers, who had gone over with the infantry. The messages were brought in by runner to the O.P.'s. and sent back to the guns by C.W. Wireless. Not only were the guns directed in this way but information regarding the progress of the attack and statements of the general situation were also transmitted by these stations.

During the day, both forward sets were moved, the Zivy Cave set going to Le Tilleuls and the other one to Farbus Wood. This was the first demonstration ever given of the C.W. system and the artillery were very well pleased with the results achieved.

Towards the end of April the Canadian personnel were withdrawn from the stations, and the First Army carried out some experimental work from Vimy Ridge. The first heterodyne wavemeter was introduced at this time and was known as the First Army or AAR type. Previous to this date damped type wavemeters had been used for both Spark and C.W. Sets.

The Organization of the Canadian Corps C.W. Section.

About the first of June, 1917, Lieutenant Fraser, of the Canadian Corps Signal Company, was placed in charge of the Canadian equipment and personnel, and the detachment became the C.W. Wireless Section of the Canadian Corps Signal Company. The good work performed by the sets during the Vimy attack had created a very favourable impression and, as a result, another course was organized for the Canadian Corps. This course was held at Caucourt and began on July 15th.

Shortly after Mr. Fraser took charge of this work, two stations were erected for the 1st Canadian Heavy Brigade. The rear set was placed at Cabaret Rouge, just east of the Arras-Souchez road, and the forward set in an O.P. just east of Red and close to Clucas trench. There was practically no line communication this far forward and some valuable work resulted during the June fighting around the Electric Power station and the Triangle. Many S.O.S. messages for the infantry were handled, and the F.O.O's. were able to quickly make alterations in barrage fire and to pass on to the guns observations concerning the effect of the fire.

C.W. Wireless in the Hill 70 Fighting.

About the end of July the Canadian Heavy Brigade stations were moved, the rear set going to the Artillery exchange at Bully-Grenay and the forward set to King's O.P. on Vimy Ridge. From these positions the first registration of guns by wireless was carried out in the Corps. This work was in preparation for the attack on Hill 70, near Loos. It was the only way in which that particular brigade could be registered, as the area to be covered could not be observed from any other point. It required three days to register all the guns, but the results were highly satisfactory. All messages and corrections went by wireless to the exchange, but by telephone from there to the batteries.

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For the actual attack on Hill 70, four C.W. stations were erected. On the left sector one station was located in Loos village to work back to Bully-Grenay, and on the right a station in Cité St. Pierre was in touch with Aix-Noulette. After the attack had started, the Loos set was to move up to the top of the ridge and the Cité St. Pierre station to Lens Hospice. The Loos station did go forward with the F.O.O. and was erected on top of Hill 70 at what later became known as Ascot O.P. The other set was never erected, as the carrying party became scattered by the shelling and were never able to re-assemble.

Very little traffic was handed in to the Ascot station until about twelve hours after zero, when the Germans began their counter-attack. The shell fire was very heavy and it was impossible to keep up lines back to the buried cable in Loos. The artillery had fifteen linemen working continuously on this stretch but the lines were hardly ever through and the F.O.O. was therefore entirely dependent on the wireless. During the first night of the counter-attack five S.O.S. calls were handled in rapid succession, and for about twelve days after the first attack some S.O.S. calls were put through every day. The units were still considering wireless merely as an emergency method of communication instead of one of the alternative systems. However, the situation was much better than on the Somme in 1916 and was steadily improving.

A Carden Mk. II set, designed for cavalry use, was introduced during this period but was not a success, and practically all the work was done on Woolwich Mark I sets. The Tonic Train, or Vibrating Transformer, that at a later date was such a success with the Field Set, 30 Watt C.W., was also tried out at this time as a source of high voltage for the plate of the valve. However, they were not employed during the actual fighting, as the personnel had not had sufficient training in their use.

And so another important step had been taken in the development of the Wireless Services in the Canadian Corps and, in fact, in the British Army. Just how important this step really was was not fully appreciated at the time, but the writer feels that he can truthfully refer to this period as the Birth of the C.W. System.

(To be continued)

